Washington

Over 80 percent of generating capability in Washington is hydroelectric, including the largest electric power plant in the United States—Grand Coulee Dam. Located on the Columbia River in central Washington and managed by the U.S. Bureau of Reclamation, an agency of the Department of Interior, the dam is the largest concrete structure in the Nation.[1] The dam has three roles: it is a major supplier of electricity to the Northwest with 24 generators providing up to 6.5 gigawatts of power; it provides irrigation for over half a million acres of the Columbia basin; and it provides flood control. Ten other dams are also located on the Columbia River.

Although most of Washington's electricity is produced using hydropower, the third largest plant in the State is a coal-fired plant, Centralia. In November 1998, PacifiCorp announced the sale by auction of the Centralia power plant and coal mine. The plant has eight joint owners, mostly utilities located in Washington. The coal mine is wholly owned by PacifiCorp. The fifth largest plant is Washington's only nuclear plant, WNP, operated by Washington Public Power Supply System. In 1996, hydropower generated 83 percent of electric power, coal-fired units generated about 7 percent, and the nuclear plant generated almost 5 percent.

Like all States west of Kansas, Washington had no units that were cited by Title IV of the Clean Air Act Amendments of 1990 to begin compliance with stricter emissions standards for sulfur dioxide (SO_2) and nitrogen oxides (NO_x). Emissions of SO_2, NO_x, and carbon dioxide from Washington generators ranked thirty-second, thirty-eighth and thirty-ninth, respectively, in 1996. The concentration rankings per square mile were thirty-fifth, forty-third and forty-fourth, respectively. Washington's totals for all three pollutants increased from 1986 to 1991, and then increased again from 1991 to 1996. The rate of increase for all three was greater in the earlier period.

Washington enjoys some of the lowest priced electricity in the Nation. The average revenue per kilowatthour, 4.19 cents across all sectors, was the third least expensive nationally in 1996. The residential average revenue per kilowatthour, 5.03 cents, was the least expensive nationally, and the commercial and industrial average revenue per kilowatthour were second least expensive at 4.88 and 2.85 cents, respectively. Washington's low electricity prices can be attributed to the presence of the federally owned dams of the Bureau of Reclamation and the U.S. Army Corps of Engineers. The power produced at these Federal dams is marketed through the Bonneville Power Administration (BPA). BPA supplies many of the State's 43 publicly owned utilities and 17 cooperatives with inexpensive Federal hydropower. Together the publicly owned and cooperative utilities represent over half the retail sales of electricity in the State. Investor-owned utilities, the largest being Puget Sound Energy, make up about 33 percent of retail sales. The remainder of retail sales, 14 percent, is sold by BPA to about 15 very large industrial customers.

With such low prices, restructuring to allow competition and reduce prices is not a priority in Washington. Puget Sound Energy and Washington Water Power are offering pilot programs in retail choice. The largest customers can have their choice of electricity generation suppliers, and some residential consumers can choose from a menu of optional pricing schemes or "green" power. In Washington Water Power's MOPS II program, electricity prices are based on several options: weekly market rates, annual market rates, a fixed rate based on Bonneville preference rates, and a "green" renewable resource rate. In May 1998, several bills concerning the electric power industry were passed by the Washington legislature as a result of their ongoing investigation into electric power industry restructuring. One allows net metering for customer on-site generation from solar, wind, or small hydroelectric sources. Another requires utilities to unbundle rates for generation, transmission, distribution, and services, and to file studies of costs, service quality, and reliability. The Washington Utilities and Transportation Commission (WUTC) completed Phase I of its investigation into electric industry restructuring in May 1998, concluding that the pace nationally toward competition is faster than expected.[2]

[1]U.S. Bureau of Reclamation Grand Coulee Dam web site located at http://borworld.usbr.gov/power/data/sites/grandcou/.

[2] Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.

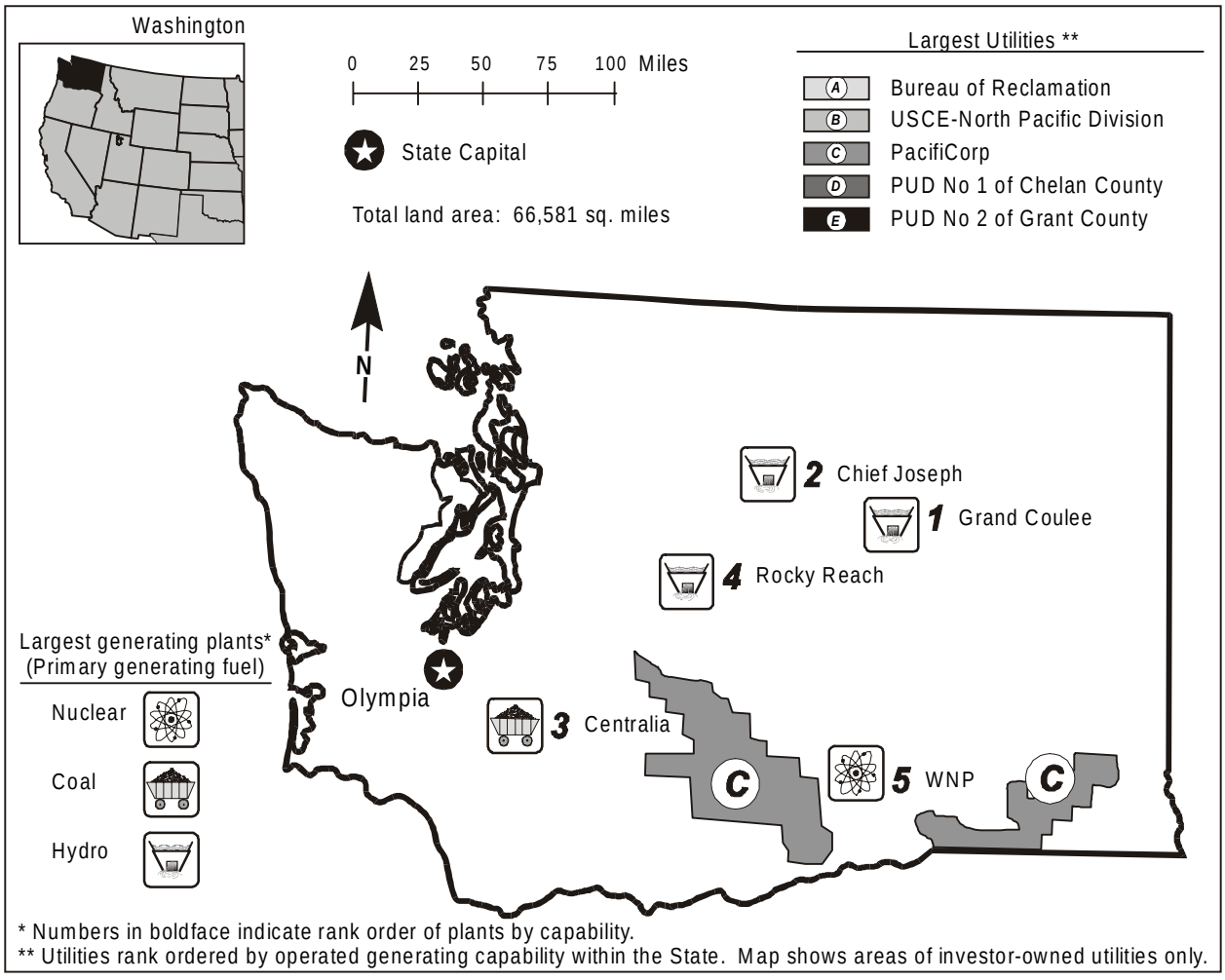

Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank
NERC Region(s)		WSCC
Net Exporter or Importer		Exporter
State Primary Generating Fuel		Hydro
Population (as of 7/96)	5,519,525	15
Average Revenue (cents/kWh)	4.19	[a]3
Industry		
Capability (MWe)	25,253	[b]8
Generation (MWh)	118,644,693	[b]9
Capability/person (KWe/person)	4.58	[b]6
Generation/person (MWh/person)	21.50	[b]4
Sulfur Dioxide Emissions (Thousand Short Tons)	72	32
Nitrogen Oxide Emissions (Thousand Short Tons)	55	38
Carbon Dioxide Emissions (Thousand Short Tons)	15,417	39
Sulfur Dioxide/sq. mile (Tons)	1.08	35
Nitrogen Oxides/sq. mile (Tons)	0.83	43
Carbon Dioxide/sq. mile (Tons)	231.56	44

Item	Value	U.S. Rank
Utility		
Capability (MWe)	24,276	8
Generation (MWh)	112,606,349	8
Average Age of Coal Plants	24 years	
Average Age of Oil-fired Plants	23 years	
Average Age of Gas-fired Plants	14 years	
Average Age of Nuclear Plants	12 years	
Average Age of Hydroelectric Plants	31 years	
Average Age of Other Plants	13 years	
Nonutility[c]		
Capability (MWe)	977	15
Percentage Share of Capability	3.9	34
Generation (MWh)	6,038,344	14
Percentage Share of Generation	5.1	30

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Grand Coulee	Hydro	Bureau of Reclamation	6,494
2. Chief Joseph	Hydro	USCE-North Pacific Division	2,337
3. Centralia	Coal	PacifiCorp	1,340
4. Rocky Reach	Hydro	PUD No 1 of Chelan County	1,280
5. WNP	Nuclear	Washington Pub Pwr Supply Sys	1,107

Table 3. Top Five Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Bureau of Reclamation	6,519	--	--	--	--	6,519
B. USCE-North Pacific Division	5,826	--	--	--	--	5,826
C. PacifiCorp	1,970	1,340	--	--	--	630
D. PUD No 1 of Chelan County	1,951	--	--	--	--	1,951
E. PUD No 2 of Grant County	1,914	--	--	--	--	1,914
Total	18,180	1,340	--	--	--	16,840
Percentage of Industry Capability	72.0	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

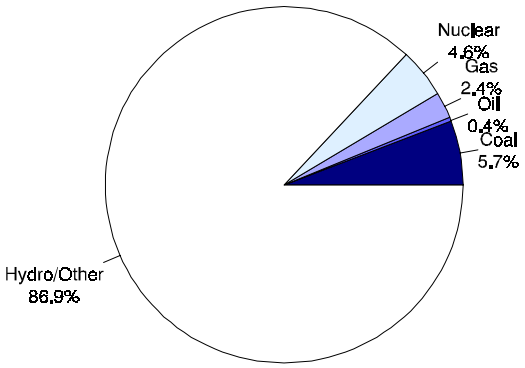

Figure 2. Utility Generation by Primary Energy Source, 1996

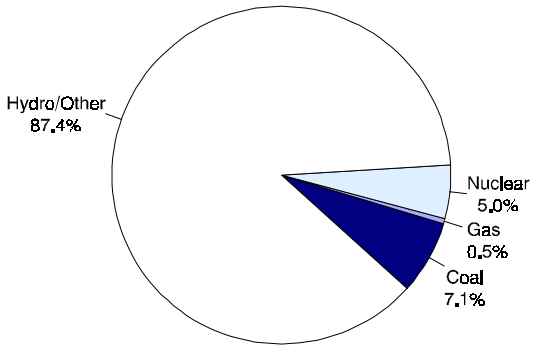

Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

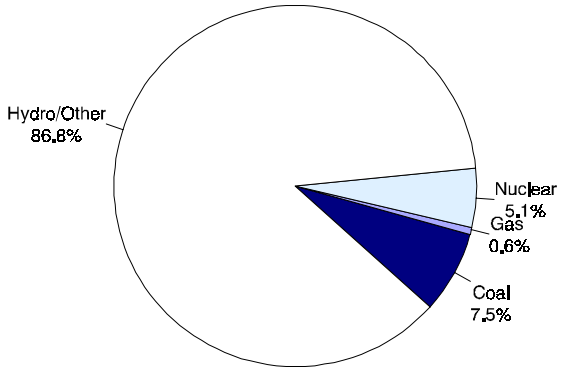

Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	1,276	1,360	1,390	5.0	5.5	5.5
Oil	227	173	87	0.9	0.7	0.3
Gas	590	590	590	2.3	2.4	2.3
Nuclear	1,940	1,100	1,107	7.7	4.5	4.4
Hydro/Other	20,961	21,020	21,101	82.8	85.2	83.6
Total Utility	24,995	24,243	24,276	98.7	98.2	96.1
Total Nonutility	317	433	977	1.3	1.8	3.9
Industry	25,312	24,676	25,253	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	5,057,993	7,903,796	8,042,462	5.4	7.7	6.8
Oil	8,436	7,121	8,183	(s)	(s)	(s)
Gas	5,121	12,093	528,958	(s)	(s)	0.4
Nuclear	8,438,964	4,229,868	5,588,000	9.0	4.1	4.7
Hydro/Other	79,021,667	89,200,167	98,438,746	84.2	86.8	83.0
Total Utility	92,532,182	101,353,045	112,606,349	98.6	98.6	94.9
Total Nonutility	1,361,273	1,429,570	6,038,344	1.4	1.4	5.1
Industry	93,893,455	102,782,615	118,644,693	100.0	100.0	100.0

(s) Nonzero percentage less than 0.05.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.054	0.083	0.087	5.2	7.5	6.8
Oil	(s)	(s)	(s)	--	--	--
Gas	(s)	(s)	0.007	--	--	0.5
Nuclear	0.091	0.045	0.059	8.8	4.1	4.6
Hydro/Other	0.825	0.923	1.014	79.9	82.8	79.3
Total Utility	0.971	1.052	1.168	94.0	94.4	91.3
Total Nonutility	0.062	0.063	0.112	6.0	5.6	8.7
Industry	1.033	1.115	1.279	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

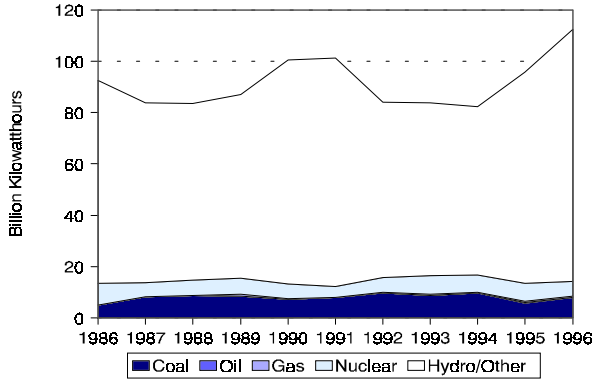

Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

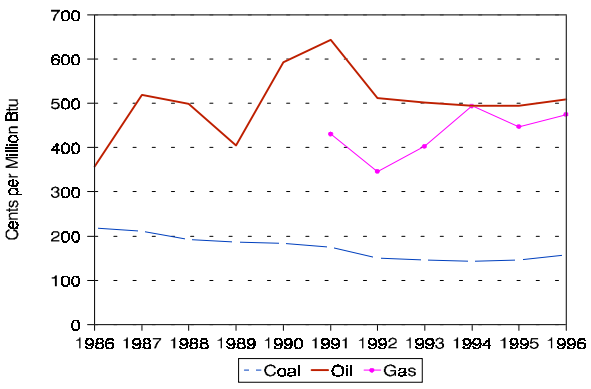

Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	217.6	174.4	156.9	-3.2
Oil	356.5	643.9	508.5	3.6
Gas	--	430.5	474.8	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	43	65	72	5.2
Nitrogen Oxides[d]	18	43	55	11.8
Carbon Dioxide[d]	5,908	12,583	15,417	10.1

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

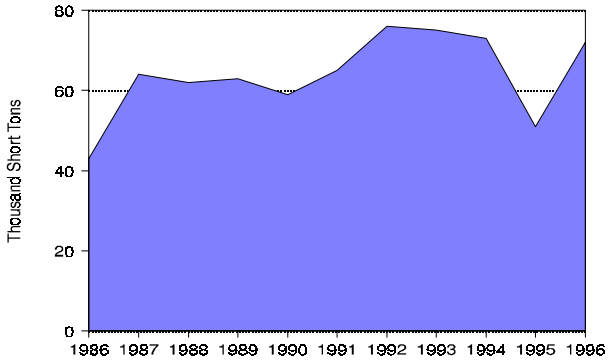

Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

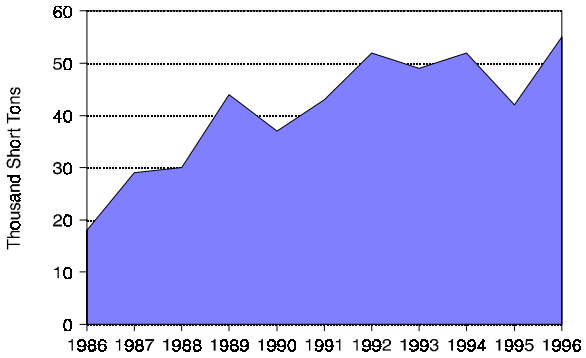

Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

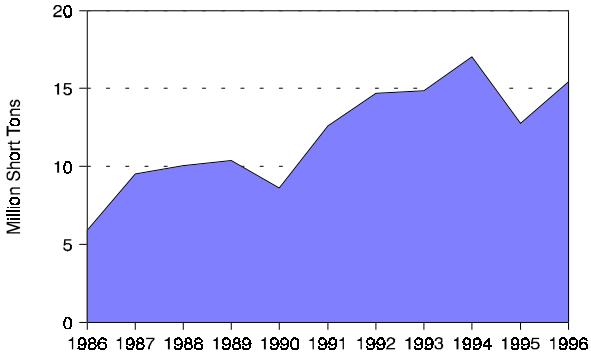

Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential	26,503,109	29,889,138	32,012,445	1.9	35.2	32.2	36.6
Commercial	15,539,460	18,143,350	21,446,321	3.3	20.6	19.6	24.5
Industrial	30,039,669	40,838,988	30,241,380	0.1	39.9	44.0	34.6
Other	3,289,414	3,842,033	3,713,112	1.2	4.4	4.1	4.2
Total	75,371,652	92,713,509	87,413,258	1.5	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

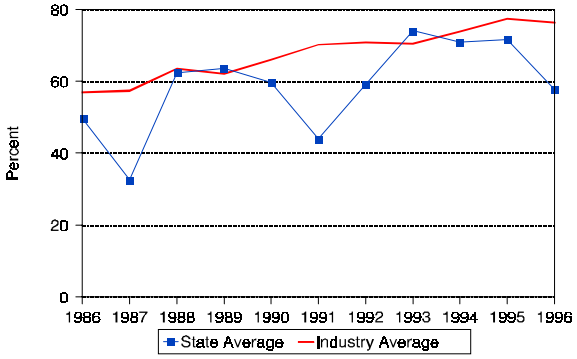

Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
			1986		
Number of Utilities	4	42	1	19	66
Number of Retail Customers	909,618	1,044,903	13	95,135	2,049,669
Retail Sales (MWh)	23,541,463	34,522,080	14,865,409	2,442,700	75,371,652
Percentage of Retail Sales	31.2	45.8	19.7	3.2	100.0
Revenue from Retail Sales (thousand 1996 $)[e]	1,305,644	1,282,192	324,131	122,691	3,128,980
Percentage of Revenue	41.7	41.0	13.4	3.9	100.0
			1991		
Number of Utilities	4	42	1	19	66
Number of Retail Customers	1,042,081	1,162,332	16	108,828	2,313,257
Retail Sales (MWh)	27,744,595	41,058,701	21,072,969	2,837,244	92,713,509
Percentage of Retail Sales	29.9	44.3	22.7	3.1	100.0
Revenue from Retail Sales (thousand 1996 $)[e]	1,445,936	1,436,698	436,861	138,189	3,511,855
Percentage of Revenue	41.2	40.9	14.0	3.9	100.0
			1996		
Number of Utilities	4	43	1	17	65
Number of Retail Customers	1,166,638	1,282,275	15	117,493	2,566,421
Retail Sales (MWh)	29,010,828	43,382,472	12,024,405	2,995,553	87,413,258
Percentage of Retail Sales	33.2	49.6	13.8	3.4	100.0
Revenue from Retail Sales (thousand 1996 $)[e]	1,632,692	1,605,614	278,699	147,636	3,664,641
Percentage of Revenue	44.6	43.8	7.6	4.0	100.0